ends, bent and supported on a retort-stand. In this the liquid was placed, and the portion in the upper part of one limb could then easily be heated and retained so, whilst that in the other limb was cold. In the experiments I will call the left-hand side *A,* and the right-hand side B, taking care to make no change of these designations. C and D are the wires of metal

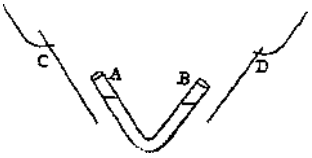

Fig. 70.

(869) to be compared; they were formed into a circuit by means of the galvanometer, and, often also, a Seebeck's thermo-element of antimony and bismuth; both these, of course,, caused no disturbing effect so long as the temperature of their various junctions was alike. The wires were carefully prepared, and when two of the same metal were used, they consisted of the successive portions of the same piece of wire.

904. The precautions which are necessary for the elimination of a correct result are rather numerous, but simple in their nature.

905. *Effect of first immersion.*—It is hardly possible to have the two wires of the same metal, even platinum, so exactly alike that they shall not produce a current in consequence of their difference; hence it is necessary to alternate the wires and repeat the experiment several times, until an undoubted result independent of such disturbing influences is obtained.

906. *Effect of the investing fluid or substance.*—The fluid produced by the action of the liquid upon the metal exerts, as is well known, a most important influence on the production of a current. Thus when two wires of cadmium were used with the apparatus, fig. 70 (903), containing dilute sulphuric acid, hot on one side and cold on the other, the hot cadmium was It first positive, producing a deflection of about 10°; but in a short time this effect disappeared, and a current in the reverse direction equal to 10° or more would appear, the hot cadmium being now negative. This I refer to the quicker exhaustion of the chemical forces of the film of acid on the heated metallic surface, and the consequent final superiority of the colder side at which the action was thus

necessarily more powerful.
Marianini has described many cases of the effects of investing solutions, showing that if two pieces of the same metal (iron, tin, lead, zinc, etc.) be used, the one first immersed is negative